G. R. S. IX-5]

Previous references.

File No. 80-15.

1915/16.

(A+J)

Serial Nos. 1, 2, 3, 10.

Later references.

A+J 4.17. ... 6/5.
? IS 136-22-13
D.O. ... 2.2.
D.O. f A1-24 (1-5, A+J)

Precedence JC 3

GENERAL AND REVENUE SECRETARIAT.

Serial Nos. 1, 2, 3 & 10.

Part B for January 1916.

SUBJECT.

Sandal wood oil Factory

To the Dir. of A+C. comptroller through Br II. Sec'y Ec. C
Cons'r of Forests. Ca'y A+C. Com. Sec'y. Rev. Dept
No. 53-58. 30.10.16.

Sanctioning the proposals of the Director of Industries and Commerce for starting an experimental Sandalwood oil Factory.

W D 88—GPB—50,000—24-7-16

G. R. S. 11] 191 5-16

GENERAL AND REVENUE SECRETARIAT.

(~~A+9~~)

NOTES.

File No. 89 of 15

FILE HEADING.

Sandal wood Oil Distillation

From

The Dir^r of I+C Mysore

No. 1117 Dated 23.9.15 Received 24.9.15

Diary No. 11 71	Enclos.	Spare Copies.	Serial No. 1

BRIEF ABSTRACT OF LETTER.

Reports that Dr. Sudborough's report regarding the enquiries he made with reference to Sandal-wood Oil Distillation whilst in London was submitted to the Dewan with his covering letter on the 22nd Sept^r 1915.

NOTES AND ORDERS.

Mr. Chatterton proposes that a ~~...~~ ~~...~~ ~~...~~

G. R. S. 121

General and Revenue Secretariat. | File No. | of 191

Serial No.

to enable him to erect a sandalwood oil factory on the edge of the Sankey's tank from which we can draw a supply of water for condensation purposes. The particulars of the machinery which he proposes to send for are given on p. 7 of his letter. As it will probably take six months to get the steam boiler and all the individual items of the plant from England he proposes to erect the buildings in the meanwhile and look out the details.

2. There seem to be two methods of sandalwood oil distillation the steam distillation method which seems to have been in use in Germany and on which some experiments have been conducted in the Indian Institute of Science and the method of boiling the wood practised in Mysore and in a crude form probably by local distillers

NOTE—Contn. sheet.

GPB—20,000—30-6-15.

General and Revenue Secretariat.

File No. of 191

Serial No.

One of the objects of the experiment is to find out which of these methods yield the best results. For Chatterton states that if his proposals are sanctioned he will be able to establish two stills in Bangalore each capable of dealing with from two to three tons of sandalwood per week or say five tons a week which will yield as gross revenue from the sale of the oil Rs. 25,000 a month or 3 lakhs a year. The question is important as to what the working expenses would be and the net result. Probably it would be difficult to calculate the expenses at this stage very accurately but it is necessary that we should have some rough idea at least.

3 The additional costs of establishment and of sandalwood the chief items of expenditure would be the price of fuel at Bangalore which is at

NOTE—Contn. sheet.

GPB—20,000—30-6-15.

Serial No.

great disadvantage as regards firewood and to enable us to come to a correct decision as to the actual net profit the firewood supplied should be charged for at the ordinary rate.

4 The factory will require the services of at least one expert chemist and it is proposed to arrange for this by entering into an agreement with Dr Sudborough and Dr Watson of the Indian Institute of Science for their undertaking all investigations necessary to put the Sandalwood oil factory on a thoroughly sound technical basis and acting as consulting chemists. For their services it is suggested that they should be paid so long as they remain in India ~~at the rate~~ Rs 500/- a month but that if at any time Govt wish to terminate the agreement

NOTE—Contn. sheet.

GPB—60,000—7-11-13

General and Revenue Secretariat. | File No. of 191

Serial No.

they should pay them Rs 30,000.

5 The points to be decided in connection with the proposals are

Decision of Council (1) Whether we may authorize Mr Chatterton to order the machinery as proposed by him.

(2) Locating the factory near Sankey's reservoir

(2) If favorable land on which Government has to be selected

(3) Cost building roads while machinery is being made

(3) Yes

(4) To be obtained on payment

(4) Arrangements with the Forest Dept for supply of sawdust wood and firewood

(5) Proposals may be further developed

(5) Method of disposal of the oil manufactured whether by Commission Agents in England or other parts of the world or by auction

(6) The remuneration which may be paid to

25/9/13

(6) Agreement with the Consulting Chemists.

6 As regards No 1 the Chatterton's proposals may be

NOTE—Contn. sheet.

GPB—60,000—7-11-13

sanctioned but to ensure the business being conducted so as to yield the most satisfactory results a Board of Management may be associated with him. This Board may consist of

(1) the Commissioner of Posts

(2) the Secretary to the Industries & Commerce Committee

This may also apply. 6 29/9/15

(3) the Comptroller of Customs

The Director may be requested to furnish a detailed estimate of cost and also a probable statement of working expenses with the net results say in 6 months or a year.

The Director has done this since 6 29/9/15

& many other subsidiary questions to be settled as

(1) training of local men for the work of officers

(2) precautions necessary

3 officers to be trained 6 29/9/15

(4) the Controller

NOTE—Contn. sheet.

GPB—60,000—7-11-13

G. R. S. 12]

General and Revenue Secretariat. | File No | of 191

Serial No.

for ensuring the purity of the article

(3) Arrangements with the Palace for permitting the use of water from the Sankey's Tank

9 The question may perhaps be considered at the next meeting of Council at which the Drinking Industries & Commerce the Financial Secretary & the Conservator of Forests may be invited & the present Copies of the proposals made by Mr. Okell can may be circulated to the other officers

24/9/15

2nd Member

Answer 10 Returns may be required circulated & circulated at monthly meeting. Meeting of the Officers named above may perhaps be put off till Friday next 4 p.m. (Mr Okell)

28/9/15

Please circulate & take act

28.9.15

Rec'd 25/9/15

Rec'd 9.30 a.m. 28/9/15

NOTE—Contn. sheet.

GEB—60,000—7-11-13

G. R. S. 11] 1915-16 (8)

GENERAL AND REVENUE SECRETARIAT.

(~~A.R.~~).

NOTES.

File No. 80 9/15

FILE HEADING.

Sandal Wood Oil Distillation

From

The Dir of I & C in Mysore

No. 1153 Dated 27.9.15 Received 28.9.15

Diary No. 1	236	Enclos. -	Spare Copies.	Serial No. 2

BRIEF ABSTRACT OF LETTER.

Furnishes certain additional information regarding the working of the proposed Sandal wood Oil plant to be erected at Hebbal, giving also the estimated cost of the plant.

NOTES AND ORDERS.

Further information furnished by Mr. Chatterton regarding cost of plant, working expenses &c. The net profit is calculated at

NOTES—First Sheet.

GPB—20,000—3-8-14

G. R. S. 12]

General and Revenue Secretariat.

A 1 / File No. 10 of 191 (9

Serial No.

Wireless Board

B
28/9/15

(10

G. R. S. 12]

General and Revenue Secretariat. | Agr | File No. | of 191..

Serial No.

24 I agree

29/8/15

V.

The question was informally discussed in Council this morning and the Council were of opinion that the Chatterji proposals to start an experimental sandalwood-oil distillation factory at a cost of Rupees one lakh may be sanctioned. The Director's salary need not be charged to the concern. Arrangements to be made to train 3 persons for the work. A committee of management to be associated with the Director as suggested in my note. The factory to be eventually located in the Shimoga District or any other convenient place where there are facilities for fuel & obtaining supplies of sandal wood

Pethy Sd Sawhney
Offg Secy Exl

16

Forwarded to the Financial Secretary for favour of sanction and also the manner in which the amounts

Serial No.

required for the machinery and for working expenses may be provided.

B-6

Petty A Secy

25.8.15

G/H Secy Govt

17

After very carefully going through the papers I fully agree that a sandal-oil distillation plant on the experimental scale suggested by Messrs Sudborough and Chatterton at a cost of about 1 lakh of rupees may be set up and that the work be completed as early as practicable.

16 The prospect of being able to sell 240 tons of sandalwood at Rs 950 a ton and of realizing a net profit of about Rs 1,14,000, every year from this experimental factory is very satisfactory.

18 If the experiment succeeds a large factory capable of dealing with the whole sandal output may be set up.

19 A sum of one lakh of rupees may be sanctioned as an additional grant for the purpose. This sum should be spent by the Director of Industries strictly under the purchase rules sanctioned by Govt and

GPB—20,000—30-6-15

General and Revenue Secretariat. | File No. | of 191

Serial No.

should be obtained by him
~~thereby~~ fresh sanction whenever necessary under
the rules. For working expenses a separate
grant may be made later on when required.

2) Accounts will be maintained for the
concern on strictly commercial principles.

3) The proposals of Mr Chatterton as regard
remuneration to Messrs Sudbrough & Watson
~~have~~ may be sanctioned. But I think there
should be no terminal payment if they
terminate their employment after a period of
say 5 (or 7) years.

29/9/15

GPB—25,000—2-11-14

For disposal at a Meeting.

No. C. 176

28.9.....1915

GENERAL AND REVENUE SECRETARIAT.

Council Matter.

SUBJECT.
(Outside the Schedule).

Question of establishing a Sandalwood Oil factory at Bangalore.

CIRCULATED TO THE MEMBERS OF COUNCIL.

By Order,

D. M. Narasinga Rao.

....28th September.....191 5. *Secretary to Government.*

Extraordinary Member of Council.

First Member of Council.

Second Member of Council. Seen by the Second Member of Council.

GPB—1,000—28-8-14

GPB—1,000—19-7-13

A+7 : 1 75 (16)

Extract from the Proceedings of the ..... Meeting of the Council of His Highness the Maharaja, held at ..... on the 191 5

4. Subject.-(Clause iii of the Schedule).

Scheme for the establishment of a sandalwood Oil factory at Bangalore.

OPINION OF THE COUNCIL.

The main lines of the scheme for establishing a sandalwood oil factory at Bangalore appear to be sound. The scheme may be approved. A detailed memorandum and a Government order may be submitted to His Highness for approval.

Sd/- M. Visvesvaraya.
Dewan of Mysore.

"Extract"
D. M. Narasimhaiya
Secretary to Government,
General Department.

1286

G. R. S. 12]

General and Revenue Secretariat. | 1933 File No. 80 of 191 5

Serial No.	
	23 With D.S.N. & Draft
	A
	Decision 30/1/15
1855 20.9.15.	

A-7

Submitted to His Highness.

24 Dr. Sudborough of the Indian Institute of Science who was deputed to make certain enquiries into the possibilities of starting Sandalwood Oil Distillation in the State, has reported favourably on the prospects of the undertaking and recommends that the Government should set up a small experimental factory in or near Bangalore at a cost not exceeding one lakh of rupees.

2. The Director of Industries and Commerce has accordingly applied for permission to purchase the necessary plant and put up a factory near Sankey's reservoir. It is stated that any water drawn from the tank for condensation purposes will be returned to the tank so that it will not in any way interfere with the supply of water to the Palace gardens. The site suggested by the Director of Industries and Commerce is within the area made over to the Indian Institute of Science and it is therefore proposed to locate the factory in the ground in which the lodge is situated.

3. The monthly working expenses are expected to be about Rs.27,975/- including a proportionate charge of Rs.500/- per mensem for the salary of the Director and the net profits Rs.9,525/- per month.

4. As the distillation of sandalwood oil has been practically stopped in Europe on account of the War and the sandalwood previously exported was used entirely for this purpose, the present moment seems to be opportune for opening an experimental factory and if the results prove satisfactory, we may be able to devise some effective measures to safeguard our revenue from this most important monopoly of the State. Mr. Chatterton thinks that we may eventually be able to start a factory yielding a net revenue of about 24 lakhs of rupees, i.e., a profit of nearly

4 lakhs by undertaking the manufacture of oil.

Flag 'C'

5. When the question was discussed in Council on the 29th September, the Council were in favour of the Director's proposals being sanctioned with certain conditions indicated in the accompanying draft. The Financial Secretary is also agreeable to the proposal.

raft for appdx

pgs 11- 12 of
ellee Note.

6. If the factory is satisfactorily set up and started, it will be desirable to pay the members of the Committee an honorarium at so much per month from the date the factory comes into operation. In the interests of the development of the concern itself, the Committee who will be in the position of Directors should be suitably remunerated.

Draft for appdx.

7. The draft order may be approved.

M. Krishnaraya

25th Oct. 1915

~~1177/156~~ 1171/1256 15

Record of Cases submitted for the Orders of His Highness the Maharaja

25

Subject.

Scheme for the establishment of a Sandalwood Oil Factory at Bangalore.

Camp. } H. No. 20 & 26.10.15.
Mysore }.

26

Order.

~~KRW~~

27/10/15

Ears

Lanka Exp

28.10.15. Ag

Ag

27/10

Ag

27/10

5/11/15

23/12/15

G. R. S. 12]

General and Revenue Secretariat.

File No. 80 of 1915-16.

Serial No.	
	The file dealt with is as in favour of the abovenoted Draft Land Endorsement Order
	26/11/15 May even be Communicated in S[ta]. by His Highness but the Suggestion Contained in the last sentence of the Note dated 29.9.15 has not been adopted Reserve 3.11.15
	Communicate 3/11 Communicated 5/11
3	G.O. Nos. 53-58 (Camp) & 30[th] Sanctioning the Director's proposal for starting an experimental Sandalwood Oil Factory

1236

Aug 9th 15. 20

G.R.S. 13]

Routine Notes.

[To be used only for notes, requisitions, etc., not intended for permanent record.]

3 A draft letter to the Residency forwarding a copy of the G. O. relating to the Sandal-wood oil factory is subd. as personally ordered by the Secy.

Swaffield

9/11

9/11

Draft may be appd (though this is not absolutely necessary there seems no harm in issuing it.)

9/11/15

2336
10.11.15.

Draft approved by Dewan

20.11.15

N.B.—Should routine notes be written on small slips, the notes must be copied, or slips pasted on to this form.

GPB—50,000—5.

G. R. S. 12]

General and Revenue Secretariat.	A+J File No. 80 of 1915-16
Serial No. 60	Letter No 681 539 dated 29th Nov 1915 to the First Assistant to the Hon'ble the Resident — Forwards a Copy of the above Order.

A-J No 13.

G.R.S. 13]

Routine Notes.

[To be used only for notes, requisitions, etc., not intended for permanent record.]

D. 2284 of 1915-16

Share cy/ys/mbrk

B. 9

letter No. 3889 & 21. 12. 15 from the A. A. Resident, requesting that 6 spare copies of G.O. No. 53-58 & Ang. 80-15 30. 10. 1915, re the erection of a Sandalwood factory at Bangalore may be supplied them.

2/B Draft forwarding the req. no. copies is subd.

CA 23/12/15

31.12.15

Draftsman

31/12

Issue

To The A. A. Resident,

No. Pol. 703 & 18.1.16.

Sm 6.

Forwards. Copies of

the G.O. No 53-58 & 30.10.15

Ang 80-15

as requested by the

A. A. Resident.

N.B.—Should routine notes be written on small slips, the notes must be copied, or slips pasted on this form.

GPB—50,000—5-8-15

DIARY No. 1177

W.D. 0713—GPB—3,500—27.8.15

1345-1915

SEC: A&D

FILE No. 801-15

No. 1117
ENCL.

OFFICE OF THE
DIRECTOR OF INDUSTRIES AND COMMERCE
"BEDFORD HOUSE," HIGH GROUND,

Bangalore....23rd September...191 5

FROM

ALFRED CHATTERTON, ESQ., F.C.G.I., C.I.E.,

Director of Industries and Commerce in Mysore,
Bangalore, (India).

To

The Secretary to the Government of Mysore,
Departments of Education and Agriculture,
Bangalore.

SIR,

I have the honour to report that I have received Dr. Sudborough's Report regarding the enquiries he made with reference to Sandalwood Oil Distillation whilst in London and I have given the same together with my covering letter to the Dewan on the 22nd instant.

I have the honour to be,
S i r,
Your most obedient servant,

Alfred Chatterton

Director of Industries & Commerce.

1117 dated 22-9-15

To

The Secretary to the Govt. of Mysore,
Departments of Education & Agri.,
Bangalore.

Sir,

With reference to Government Order No. 3497-3501/ A & I.69-14-14 dated the 22nd March 1915, I have the honour to forward the report submitted by Dr. Sudborough embodying the results of his enquiries with respect to the prospects of the manufacture of Sandalwood Oil in this State.

Dr. Sudborough was asked:

(1) To ascertain how the trade in Sandalwood and Sandalwood Oil has hitherto been conducted in Europe and America and through what agency;

(2) To ascertain as far as possible detail of the methods at present employed for extracting the oil from Sandalwood.

(3) To obtain plans and estimates for a complete Sandalwood Oil Distillation plant.

(4) To ascertain the views of the large users of Sandalwood Oil in regard to the Agency which should be employed by the Mysore Government for the disposal of the Sandalwood Oil manufactured in Mysore with a State guarantee as to its purity.

(5) To ascertain the best methods of shipping

shipping the Oil from Mysore to Europe.

Dr. Sudborough appears to have taken a large amount of trouble to obtain information on all these points and though the results of his enquiries are not as conclusive as I should like, he has obtained a large amount of very useful information which will enable us to advance, at any rate, another stage in the development of this industry in the Mysore State. The most important definite information which he has obtained is:

(1) That the Sandalwood Oil manufactured by Steam Distillation at the Indian Institute of Science is equal to the best oil on the English Market and that so far as the quality of the Oil is concerned, the process of Steam Distillation is thoroughly satisfactory.

(2) That there will be no difficulty in making commercial arrangements for the disposal of the oil in London and that, in fact, he has obtained the names of a number of firms who will be quite willing to take up the Agency.

(3) That the Oil can be shipped to Europe in sealed tin-plate drums similar to kerosine oil tins.

(4) That the method of Steam Distillation is not used by English manufacturers of Sandalwood

Oil

Oil but that it is almost certainly used by the German distillers. Dr. Sudborough has ascertained that nowhere in England is Sandalwood Oil manufactured in very large quantities and that no firm has any experience on a large scale of the manufacture of the plant suitable for Sandalwood Oil Distillation.

As was expected, no one manufacturing Sandalwood Oil would give him any information regarding the process. Combining the experience that we have gained during the past nine months at the Indian Institute of Scienc with the information collected by Dr. Sudborough, I am now able to submit the following as definitely ascertained facts:

(1) That Sandalwood Oil may be extracted either by Steam Distillation or by boiling the wood in a closed vessel fitted with continuous stirring arrangements and that the quality of the Oil produced by either process is practically the same and that so far as this point is concerned, either process can be adopted.

(2) That the Steam Distillation process, provided that the wood can be reduced to a suitable form, is the simplest and cheapest to adopt as regards the working expenses and the initial outlay on the plant.

(3) That there will be no difficulty in getting stills to work by either process.

The

An important matter upon which definite information has not yet been obtained is the breaking up of the wood so as to obtain it in the form most suitable for the Distillation process.

Dr. Sudborough has purchased two different types of machines but neither of them have yet arrived here and the French machine from which I expect that the most favourable results will be obtained, is not likely to be sent out for several months. The whole question as to whether we should adopt Steam Distillation or boil the sandalwood chips in water entirely depends on whether we can successfully and cheaply reduce the wood to a form suitable for Steam Distillation. We are doing this now in a very satisfactory way in the case of Ghotla wood by turning it up in a lathe; but this process is not applicable to roots and irregular pieces of wood. There is no doubt that a chipping machine and a disintegrator will reduce the wood to a suitable form for the extraction of Oil by boiling. So far as I can see, it will take at least six months and may take possibly a year or even longer before we can finally decide whether Steam Distillation is practicable or whether we shall have to adopt the method of boiling the wood. I am almost certain that the Steam Distillation method will prove the best to adopt as soon as we

can

can

can find a suitable machine for cutting up the wood; but if we wait for this, we shall lose a large amount of valuable time.

Previous to the out-break of War, the net revenue to Government from the sale of Sandalwood amounted to over 20 lakhs of rupees a year and if we establish a Sandalwood Oil Factory in this State, we may fairly calculate on a net revenue under the old conditions of not less than 24 lakhs of rupees a year, or ~~take~~ two lakhs a month. The sooner we get to work the sooner we shall be in a position to realise whatever profits are to be got from the Sandalwood monopoly and from the manufacture of the Oil in the State. At the present time, the price of Sandalwood Oil in London is very high but there is no very large demand for Sandalwood mainly because the largest buyers are entirely cut off from the market and it is possible will be cut off from the market for a long time to come. I allude to the possibility of the prohibition of the sale of Sandalwood to German distillers. Apparently no one at the present time is willing to invest large sums in Sandalwood or to take any risks which they would have to take if they made any attempt to capture the business hitherto done in Germany. Now the position of the Mysore Government is entirely different. The Government has the whole of the Sandalwood in its hands and it involves

1029

involves no investment of capital to start a Sandalwood Oil Distillation beyond what is necessary for the plant and machinery. Government therefore start with an enormous initial advantage over any private competitor who will have to lock up a large amount of capital in Sandalwood before he commences work. I therefore urge as strongly as I possibly can that Government should proceed with the development of this industry as rapidly as possible. It is desirable of cour to keep the capital outlay down to the minimum possible; but the immediate advantage t be derived is so very great that it will be extremely unwise to delay matters for the sake of effecting petty economies.

The proposals submitted by Dr. Sudboroug at the conclusion of his report fall in with my own views as to what should be done. The proposal is to establish two stills in Bangalore each capable of dealing with from two to three tons of Sandalwood per week, or say five tons a week which will yield as gross revenue from the sale of the Oil of Rs. 25,000/- a month or 3 lakhs a year. The expenditure on this plant will be less than one lakh of rupees but it is not possible to submit complete detailed estimates as the stills have to be manufactured and working drawings sent out to this country before the final plans can be drawn out here.. I therefore definitely propose to Government that

1023

that the sum of one lakh of rupees be placed at my disposal to erect a Sandalwood Oil Factory on the edge of the Sankey's Tank from which we can draw a supply of water for condensation purposes and which water will be returned to the Tank so that it will not in any way interfere with the supply of water to the Palace Gardens. I request that I may be authorised to purchase all the necessary plant for the establishment of this Factory under such conditions as will ensure the minimum amount of delay in getting it. The details of the Factory will have to be worked out in consultation with the makers of machinery. The plant to be purchased includes the following major items:

(1) A self-contained steam boiler to generate about 2,000 pounds of steam per hour and fitted with a wood burning furnace.

(2) One Steam Still capable of holding a ton of prepared Sandalwood and yielding according to our present information about 30 pounds of oil per day.

(3) A Boiling pan with stirring arrangements to deal with from a ton to a ton and a half of Sandalwood at a time and capable of turning out from 30 to 40 pounds of Sandalwood Oil per day.

(4) A circular saw, 2 or 3 chipping machines and a disintegrator.

1229

(5) One weigh-bridge and two weighing machines for weighing the material dealt with at the various stages of the work.

(6) An Electro-motor and shafting to drive the wood preparing machinery.

(7) Electro-motors and Pumps for dealing with the condensing water and a water supply to the boilers and to the stills.

(8) All the necessary tanks and measuring apparatus.

(9) A Water Tower with a water tank on the top to supply water to the whole place with a sufficient pressure to carry on the work.

(10) A Motor generator and an electric light plant for night work.

The Factory will consist of two portions; the outer portion will contain the steam boiler, the pumps, the firewood store and everything not directly connected with the Sandalwood Oil manufacture; the inner portion which will only be open to the actual working staff will contain the Sandalwood, the stills and the Sandalwood Oil tanks and will be so arranged as to preclude the possibility of the unauthorised removal of any sandalwood or its products. It will probably take six months to get the steam boiler and all the individual items of the plant from England and during that time the buildings

buildings can be erected and all the details of the plant worked out.

The object of this Factory is first to manufacture Sandalwood Oil and secondly to determine which of the two processes possibl is the best to adopt on a large scale. I a inclined to think that for different kinds o wood it will probably be necessary for the final Factory to have both processes at work and if my conclusions prove to be correct, all the plant and machinery which I now propose to purchase can be used in that final Factory.

I am not prepared to undertake the constructions and working of this Factory unless I am provided with competent technical advice and chemical assistance and I think such assistance as I require can be rendered by Dr. Sudborough and Dr. Watson of the Institute of Science. I have enquired from them if they are willing to jointly place their professional services at the disposal of the Mysore Government for all investigations necessary to put the Sandalwood Oil Factory on a thoroughly sound technical basis. They are willing to do this but have left it to me to suggest suitable terms on which they are to be remunerated. To this question I have given much consideration and the proposals which I now submit are based upon the idea that Government should not be called upon to pay higher fees till the

work

work has been demonstrated to be a commercial success. I propose to offer Messrs. Sudborough and Watson a fee of Rs.500/- a month as conculting chemists to the Government of Mysore in regard to the manufacture of Sandal wood Oil, that if Government abandon the manufacture of Sandalwood Oil, they should have no claim upon Government but that if in consequence of the assistance rendered, the Sandalwood Oil Manufacture becomes a permanent feature of the State Administration, they should continue to be Consulting Chemists to the Government of Mysore on a salary of Rs. 500/- a month so long as they remain in India but that if at any time Government wish to terminate the agreement, they should pay to Messrs. Sudborough and Watson a sum of Rs. 30,000/-. I would point out that there would be a large amount of work to do in starting this Sandalwood Oil Factory and that a fee of Rs.500/- a month is a very moderate remuneration for two highly trained experts whose time will be largely taken up with the various problems which will arise in connection with this industry. After the Factory is once established, the consulting work will not be of a very onerous character and that then the fee will be inadequate. In regard to the terminal payment of Rs.30,000/-, that charge will only arise when Government are carrying on an industry with a net turn-over of from 25 to 30 lakhs of rupees a year. These proposals in regard to remuneration

are

1023

are analogous to the agreements usually entered into with the Managing Agents of commercial concerns. If Government are not prepared to accept these terms, it will be necessary to employ permanently an expert Chemist who will require a high salary and it will probably be very difficult to get a man to come out and much delay may thereby be caused. I have no hesitation in saying that the proposals I submit are extremely reasonable. If Government are pleased to approve of the general conditions, the minor details can be easily embodied in the agreement. Amongst minor details, I should provide for the adequate training of Indian assistants to carry on the work in the Factory.

In conclusion, I would desire to point out that if Government wish to obtain a large revenue they have lately enjoyed from the Sandalwood monopoly, it is necessary to proceed on commercial lines and to place the matter in the hands of people they can trust. The ordinary procedure of Government with the vast amount of delay entailed in getting estimates sanctioned is wholly inapplicable. The expenditure which I contemplate is only equal to four months revenue of the Factory after it is at work and is only equivalent to placing at my disposal about a hundred tons of Sandalwood now lying in the forests or at the Sandal Kotis.

1020

Kotis. The position is an altogether abnormal one. Government have everything to gain by proceeding rapidly with this business and I would strongly urge that orders should be issued on these proposals with the minimum possible delay.

I have etc.,

Director.

21st September 1915.

1220

REPORT ON SANDAL WOOD DISTILLATION.

--O:(O):O--

At Colombo I received a telegram from the Hon'ble Sir Hugh Daly, British Resident in Mysore, stating that, as Mr. Gubbay had left London, Professor Wyndham R. Dunstan F.R.S., of the Imporial Institute was making enquiries for the Mysore Durbar on the question of the distillation of Sandal wood. On reaching London I had an interview with Prof. Dunstan. He showed me a considerable amount of correspondence he had received on the subject, but gave me no details as regards the distillation of the oil in England or abroad. Prof. Dunstan gave me the names of several makers of chemical plant and machinery and from these firms I was able to get to know of others who specialised in the manufacture of stills and chipping machines. Prof Dunstan also tried to obtain permission for me to visit works where Sandal wood distillation was carried on, but firms were not willing to admit me to their premises. As the result of numerous visits I have been abled to collect the information grouped under the following heads:-

I. Methods of Distillation.
II. Types of stills.
III. Chipping or Rasping machines.
IV. Methods of packing.
V. London Agency.

Most of this information has been gathered from the makers of machinery, and not from distillers. The only firm of distillers at all willing to give me information were Messrs. Whiffin of Battersea.

Mr. Whiffin stated that he regarded it as certain that, sooner or later, the distillation of sandal-wood would be undertaken in India.

In an interview I had with Mr. Lescher, one of the managing directors of Messrs. Evans Son Lescher & Webb of St. Barthlomew's Close, the suggestion was made that, if the exportation of Sandal wood from Mysore were stopped, English and foreign distillers would attempt to obtain wood from other sources, and mentioned the occurence of Sandal wood in Java, Mauritius and especially in Western Australia. The question of the occurence and use of Sandal wood in Western Australia I referred to Prof. Dunstan, and his reply shows that the competition from Western Australia could not be of a severe character. From the data given the yield of oil is poor and the oil itself is much inferior to East Indian Oil. I understand that the cost of collecting the timber is high as the trees are very scattered. A small amount of the wood is distilled in Western Australia as several years ago a distilling plant capable of dealing with 3 - 4 tons of wood per week was sent to the Colony by Messrs. Bennett Son and Shears.

Messrs. Gildmeister & Hoffman state that the oil has properties entirely different from East Indian Sandal-wood oil and can therefore never be used as a substitute for the East Indian Oil, although it is used as an adulterant.

As regards the relative proportions of wood distilled in different countries it is not possible to give accurate information. The proportions vary from year to year, but the general opinion is that Germany takes the gerater portion

The two chief uses to which the oil is put are:-

(a) Medicinal

(b) For perfumery and soap making.

According to Mr. Lescher the great bulk is used medicinally and the tendency is rather in the direction of an increase than a decrease in its use for this purpose.

The price of the oil on the London Market is extremely high. In the first week of August the wholesale price was 27/9 per lb. and the general opinion is that the price will rise.

There is a good demand for the oil in London. Messrs. Evans Son, Lescher and Webb would be willing to take several hundred weight per month and Messrs. Burgoyne, Burbidges & Co are also prepared to purchase the oil.

Samples of the oil were forwarded to 4 or 5 different firms. The only firms who reported on the oil viz. Messrs.

Burgoyne, Burbidges & Co., and Messrs. Whiffin, state that the oil is of good quality and fulfils all the requirements of the British Pharmacopoeia. See copy of reports appended

METHODS OF DISTILLATION.

Apparently the only method of distillation adopted in England is that of boiling the finely divided wood with water. This information I gathered both from the makers of plant for some of the biggest distillers and also from two firms engaged in distilling the wood. A similar method is adopted in France. I could obtain no direct information about the German method of distillation but from information given in Richenberg's "Gewinnung und Trennung der aetherischen Oele" it is certain that they adopt the method of treating the wood directly with steam.

The state of division of the wood varies according to the method of distillation adopted. When the English method of boiling with water is used, the wood is always in a fine state of division and the most convenient method of doing this is by passing the wood through a disintigrator.

When live steam is used it is essential that the wood should not be used in the form of a powder, but in the form of turnings, raspings or chips. I could not obtain information as to the best form of turnings or chips to use for this

1022

purpose, and the information can only be obtained by actual experiment.

I was told that one firm had tried the use of direct steam but had abandoned that method and adopted the method of boiling with water. Mr. Whiffin informed me that the oil obtained by the direct use of steam differs in colour, rotatory power and solubility from the oil prepared by the English method. This can only be true when superheated steam is used as the oil prepared in the Laboratories of the Indian Institute of Science does not differ from English made oil as regards colour, rotation or solubility.

II. TYPES OF STILL.

A. For Boiling With Water.

The still used for this purpose is of the following type. The body consists of a copper boiler surrounded by a cast iron jacket through which steam is passed. The upper part of the still is also of copper and is heavily tinned, and terminates in a delivery tube of pure tin attached to a pure tin condensing coil. Several firms I interviewed insisted on the necessity of having the delivery tube and the condensing tube made of pure tin, as copper lightly tinned does not last, the tin is rapidly removed by the great rush of steam and then the bare copper discolours the oil.

The still is half filled with a mixture of water and finely divided wood which is kept in motion, during the whole time the distillation is proceeding, by means of a slowly driven stirrer or rouser. The usual time required for removing the oil from a charge of wood is 72 hours.

The distillate after removal of most of the oil in the separator is returned to the still.

The stills of the type made by Messrs. Bennett Sons & Shears Ltd., (now incorporated with H. Pontifex & Sons Ltd. The Farringdon Works, Shoe Lane, E.C.) are of 900 gallons capacity. The diameter is 6' and each still will take a charge of 1/3 to 1/2 ton. The price for a still, including tin worm condenser, separator and return pipe, is given as approximately £.400/-

To obtain the wood in a fine state of division it is first cut by means of a circular saw, then chipped by means of a machine of French make and is finally passed through a disintegrator.

For a complete plant capable of dealing with about 3 tons of wood per week by this method this firm quote an approximate price of £.3,000/- This includes boilers, steam engine pumps, tanks, circular saw, chipping machines, disintegrator, stills, condensers, separators and necessary belting, pipes cocks etc.

Messrs. John Dore & Son of Bromley-by-Bow, E.C. make a still of similar pattern. Each still is capable of taking from 28 - 30 cwt. of wood powder at a charge and, as each charge requires 72 hours for complete distillation, a single still would be capable of dealing with anout 3 tons of wood per week. This firm makes use of a patent dome condenser and finally cools the distillate by means of a pure tin worm. Their price for a still, condenser and separator together with frame work is £.1180.

Messrs. W.J. Fraser & Co., of Dagenham Essex, promised to give me a quotation for a distilling plant but did ~~not~~ not do so, and I gather that they are not makers of this type of plant.

B. Direct Treatment with Steam.

Messrs. Blair Campbell & McLean Ltd., of Govan, Glasgow have erected large plants for dealing with cedar wood in America but have had no experience in dealing with sandal-wood.

They have given a quotation for a complete plant dealing with 1250 tons of wood per year. The plant consists of steel stills, copper condensers and separators, steam boiler, wood chipper, engine, electric generator, elevator and necessary iron buildings and the price quoted is £.2,500 (approximately

This estimate is based on the assumption that a charge o

wood could be dealt with in 24 hours, this is too low a value, it should probably be 52 or or even 70, and this would entail a much larger number of stills and condensers and increase the cost probably to £.6,000 or £.7,000. By the substitution of tinned copper stills the above price of £.2,500 would be increased by about £.515/-

No arrangement is made in this plant for returning the distillate to the still and it would be an advantage to have such an arrangement.

Messrs. George Scott & Son Ltd., also suggested iron stills but according to Messrs. John Dore & Son both iron and aluminium stills have been tried and are not a success as they pit very readily.

Messrs. George Scott & Son Ltd., have made a small stil for dealing with about 2 cwt. of wood. The chipped wood was packed in a cage which was suspended in the still. A small amount of water was placed below and steam was blown into this.

I have obtained estimates for a copper still for treati about one ton of chipped wood at a charge. This still is specially designed for experimental purposes and the prices quoted are.

Messrs. Brown & Son of
Caledonian Road.) ..... £.200 appro

Messrs. Geo. Scott. ..... £.637

Messrs. John Dore & Co. ..... £.640

III. CHIPPING MACHINES.

I found considerable difficulty in obtaining detailed information with regard to rasping or chipping machines and also in obtaining samples of wood which had been chipped by any particular type of machine.

In England apparently only two types of machines are used namely (a) English and (b) French.

(a). English Machine.

Two firms make machines of this type namely Messrs. R.G. Abererombie, Broad St. Engine Works, Alloa N.B. and Messrs. A Ransome & Co., Ltd., Stanley Works, Newark or Trent.

The machine consists of a large revolving disc with projecting knives and the wood is held at an angle against the revolving disc. The depth of knife edge projecting can be varied in order to give chippings of different thickness, the type of chip also varies considerable with the angle at which the grain of the wood is held against the disc. Usually four blades are used and they require re-grinding fairly frequently. I have bought a second hand machine of this type from Messrs. Abererombie for £.40. This same firm make a larger machine of the same type. This is provided with an automatic feed and is designed for chipping logwood and other

dye woods before treatment in extracting vats. Such a machine turns out about 3 or 4 tons of log wood per day and costs about £.500.

Messrs. Ransome & Co's machine is of the same type, is somewhat more compact and has rather smaller knives. The price of this machine as quoted by Messrs. Fraser is £.47. It is capable of turning out 480 - 600 lbs of quassia chippings per hour and requires 9 - 13 B.H.P. according to the thickness of the chips.

Messrs. J. Harrison Carter Ltd., Engineering Works, Dunstable quotes £.35 for what is apparently the same machine.

Messrs. Stafford Allen & Co., one of the chief distilling firms in England use a machine of this make but have altered it somewhat and have fitted it with an automatic feed.

Messrs. Blair Campbell and Mc. Lean have sent me a quotation for large chipping machines. The smallest of these costs £.500 requires 50 H.P. and chips 3000 lbs of wood per hour. These machines are not made by Messrs Blair Campbell and Mc.Lean. It is a 'Williams' machine made in America and has been used with success on cedar wood in that country. I was not able to obtain samples of wood chipped by this type of machine.

1023

(b). French Machine.

The French machine differs in having a heavy fly whhel and in haivng the knives inserted at an angle through a truncated cone. These machines are not provided with automatic feeds.

A Machine recommended by Messrs. Bennett Son & Shears costs £.80. and would turn about half a ton per day.

Messrs. Whiffin recommended machines made by Messrs. T. Robatel, J. Buffand & Co., Chemin de Baraban 59 - 69, Lyon. The smallest size of this machine costs £.60 and is capable of dealing with one ton of wood per day and requires only 2 H.P. The largest size costs £.120, chips about ten tons per day and requires 15 - 20 H.P.

This machine has ~~new~~ two sets of knives and is thus more efficient than the one recommended by Messrs. Bennett Son and Shears.

I have ordered the smallest size of this type of machine but it will be 3 - 4 months before it will be ready for delivery.

III. METHOD OF PACKING OIL FOR EXPORT.

All the firms I consulted were of opinion that the best method of packing the oil for transhipping to London

was in Stout iron drums or rectangular tins well tinned and with caps soldered on. The sizes should be 14, 28 or 56 lbs. and the tins should be packed in wooden cases containing one cwt. each.

IV. METHOD OF SALE AND LONDON AGENCY.

All the firms I consulted were of the opinion that the method of putting the oil up to auction was not advisable as it would probably lead to 2 or 3 of the biggest firms combining and buying up the whole amount.

The general view was that a London Agent working on a commission would deal with the sales in the most satisfactory manner.

Of the firms I consulted the following stated that they were not prepared to take up the agency:-

Messrs. Burgoyne, Burbidges Ltd.
Messrs. Evans Lescher, Son & Webb Ltd.

On the other hand, the following firms expressed their willingness to undertake the agency under suitable terms.

Mr. C.H. Bryant, Henage Lane, Bury St., E.C.
Messrs. R. Morrison & Co., 2 Fen Court, E.C.
Messrs. H.B. Sleeman & Co., Ltd. India House Leadenhall St., E.C.
Messrs. Sparks & White, Albion Mills Tenter S. East, E.
Messrs. Whiffin & Sons Ltd., Lombard Rd., Battersea, S.W.

Mr. Bryant asks for a 5% commission and out of pocket expenses.

Messrs. Morrison ask for a commission of 2½% on sales and in addition the Mysore Government would pay for storage at Wharf and cost of insurance.

Mr. Soalfeld, the Chairman of Messrs. Sparks and White, stated that he was willing to undertake the agency mainly on account of the standing the agency would confer on his firm and mentioned 1 or 2% as a suitable commission. Messrs. Sparks & White are dealers in Sandal wood oil and sell from 5 - 6 tons a year.

Messrs. Sleeman & Co., Ltd., as-k for a 2½% commission and Messrs. Whiffin & Sons Ltd., ask for a 2% commission and 1½% for bad debt risks.

RECOMMENDATIONS.

The present price of Sandal wood is so high that the distillation of the wood should be a highly remunerative process, and it is advisable that the production of the oil on a fairly large scale should be proceeded with as soon as possible. The results of the examination by Messrs. Burgoyne Burbidges & Co., and by Messrs. Whiffin & Sons prove that the oil as distilled in the Institute Laboratories is of high quality and fulfils all the requirements of the British and

other Pharmacopoeias.

The main question that has to be decided is whether the English method of distillation is adopted or whether the method as now used in the Institute should be used.

With the knowledge available it is difficult to decide between the two. The plant for the English method would be more expensive-the stills as separate from the other plant would cost three times as much as the stills required for use with steam--also the working expenses would be rather heavier when water distillation is used. On the other hand if the English method were adopted, at least two Engineering firms in England have standard stills and plant which they could supply within several months. With the direct steam method it would be necessary to make further experiments in order to determine the best type of still and it would be very rash to order a complete factory containing 10 or more stills before further experiments with a still of about one ton capacity has been carried out.

I would strongly urge the Government of Mysore to put up a small experimental factory in or near Bangalore at a cost not exceeding ~~ae~~ one lak of rupees. Such a factory should be equipped with the following:-

(a) Boiler and wood shed.

(b) Copper still for treating a charge of one ton of wood with steam.

~~(a)~~

 1022

(c) Copper Jacketted still for boiling 1 to 1½ ton of powdered wood with water.

(d) Condensers and separators.

(e) Pumps, Tanks.

(f) Weighing machines.

(g) Chipping machine and disintegrator.

(h) Store rooms and Laboratory.

Such a factory should deal with at least 4 to 5 tons of wood per week and should give 4 or 5 cwt. of oil per week.

In such a factory experiments could be made with stills of much the same capacity as would be subsequently used in a large factory. Such experiments would enable the Government of Mysore to determine which of the two methods of distillation was the more economical and which gave the better results.

Towards the equipment for such a factory the Government will already have two chipping machines and a disintegrator.

Sep 20 : 1915.

J. J. Sudborough

REPORTS ON SANDAL WOOD OIL DISTILLED IN THE LABORATORIES OF THE INDIAN INSTITUTE OF SCIENCE.

--o:(o):o--

A. From Messrs. Burgoyne Burbidges & Co.,
East Ham,
L O N D O N, E.

We have tested the oil submitted by Dr. J.J. Sudborough and we find it is a very good sample. It answers all the requirements of the British Pharmacopoeia.

Yours faithfully,
(sd). Burgoyne Burbidges & Co.,

July 22nd 1915.

B. From Messrs. Whiffin & Sons Ltd.,
b Lombard St.,
Battersea.

With regard to the sample of Sandal Oil you left with us, we have pleasure in advising you that we found this fully up to standard. It answers all requirements, its solubility is correct, likewise the optical refraction and other tests required by various pharmacopoeia.

Yours faithfully,
(sd) W. Georg·· Whiffen,
Director.

July 29th 1915.

W.D. 0718—GPR—3,500—27-8-15

No. 1153
Encl. 2

Office of the
Director of Industries and Commerce,
"Bedford House," High Ground,

Bangalore...27th September...191 5

From

ALFRED CHATTERTON, Esq., F.C.G.I., C.I.E.,
Director of Industries and Commerce in Mysore,
Bangalore, (India).

To

The Secretary to the Government of Mysore,
Departments of Education and Agriculture,
Bangalore.

Sir,

With reference to your D.O. No.3 dated the 24th September 1915 and in continuation of my No. 1129 dated the 21st September I have the honour to forward the following additional informatio regarding the working of the proposed Sandalwood Oil plant to be erected at Hebbal:

I have ascertained definitely that the convenient site whic I have selected is on land which has been handed over by Government to the Indian Institute of Science and permission will have to be obtained from the Council of the Institute to erect the building thereon. In this matter I anticipate no difficulty.

I append to this note a rough statement as to the estimated cost of the plant but I should like Government to clearly understand that it is only a rough estimate as conditions at the present moment preclude any possibility of preparing an accurate forecast of the expenditure. All I can now say is that I think I have provided more than sufficient to cover any probable contingencies. In regard to the working expenses and the profits likely to be obtained, I have gone into this matter carefully with Dr. Sudborough and we are agreed that the statement I now submit is one which is likely to be realised in the immediate future.

future.

In my first letter No.1129 of the 21st instant I pointed out that under the extraordinary circumstances now existing, the profits which Government would derive from the manufacture of Sandalwood Oil would be exceptionally large. From the information supplied to me by the Conservator of Forests, it appears that recently 143 tons 14 Cwts.102 pounds of Sandalwood have been sold realising Rs.1,34,775 which works out to an average rate of Rs.937-8-0 a ton. Our experiments at the Indian Institute of Science justify us in expecting that we can obtain 100 pounds of Sandalwood Oil from an average ton of wood. When Dr. Sudborough went on furlough, he took with him 10 or 12 pounds of Sandalwood Oil as samples and at the conclusion of his enquiries he had 5 or 6 pounds of Sandalwood Oil left and this he disposed of in London through an Agent at 26 shillings a pound equivalent to Rs.19-8-0 per pound, that is to say, if we can still obtain the same price, there is a difference of Rs.1,000/- per ton between the cost of Sandalwood and the value realised from the Oil obtained from the wood. This very large difference is, as I have already pointed out, due to the exceptional circumstances prevailing at the present time. It appears that the bulk of the Sandalwood Oil was formerly manufactured in Germany and that the English Distillers only worked on a small scale. It further appears that at the present time they are not prepared to invest large sums of money in the purchase of Sandalwood to be subsequently made into Oil. The result is that, at any rate on the London market, the price of Sandalwood Oil is now very high and the profit from its manufacture very considerable. In preparing the statement of profits which I now submit I have assumed that the average price we shall pay to Government for the Sandalwood used in the Factory will be Rs.950/- a ton and that the average price we shall obtain in London will be 25 shillings a pound or Rs.1,875/- per 100 pounds, the quantity we expect to obtain from one ton of Sandalwood. This leaves us a margin of Rs.925/- per ton to work upon.

The

The plant which it is proposed to instal, we calculate, will be able to turn out 2,000 pounds of Oil per month and will consume 20 tons of Sandalwood for which we shall pay the Forest Department Rs.19,000. The following is an estimate of the working expenses including the cost of establishment and every other charge which can be foreseen:

Director of Industries & Commerce, Share of his pay to be charged to the Sandalwood Oil Factory.	Rs. 500	a month
Consulting Chemists	500	,,
Works Manager	200	,,
2 Assistants, Rs.100/- each	200	,,
2 Mechanics, Rs.40/- each	80	,,
6 Firemen, Rs.10/- each	60	,,
30 unskilled labour, Rs.10/- each	300	,,
Clerical establishment & Peons.		
1 Headclerk	60	,,
1 Accountant	40	,,
1 Clerk	20	,,
3 Peons on Rs.8/- each	24	,,
2 Watchmen on Rs.8/- each	16	
~~Contingencies~~	~~80~~	
Total Rs.	2,000	,,

Working Expenses: The principal item of working expenses will be fuel. In estimating the amount of fuel required, I assume that 3 tons of steam will be obtained from one ton of firewood and that from each ton of steam we shall obtain 4½ pounds of Oil so that from a ton of firewood we shall obtain 13½ pounds of Oil. The weight of firewood therefore required will be 2,000÷ 13½ which is approximately 150 tons and 150 tons of firewood at Rs.9/- a ton will be Rs.1,350/-. The next important item will be power and light which I assume will cost us Rs.750/- a month and will be derived from the electric supply mains to the Indian Institute of Science.

Science. The cost of packing and freight on 2,000 pounds of Oil per month is estimated at Rs.500/- and to be well on the safe side, I propose to allow a further Rs.500/- a month for unforeseen contingencies, bringing the total working expenses to Rs. ~~2,500~~ 3,100/- a month. The only other item to be allowed for is depreciation and for this item, considering the factory is a temporary one, I propose to allow a very large amount, Viz. Rs.24,000/- a year or Rs. 2,000/- a month. We have then to meet the Agency charges in London and this I assume will be rather high as the quantity of Oil to be delivered will not be very large. The firms in London have offered to do the work for 2½ per cent; but in this estimate I propose to allow for a maximum of 5 per cent. or Rs.1,875/- a month The monthly Balance Sheet then works out as follows;-

Establishment	Rs. 2,000	By sale of 2,000 pounds	
Working Expenses	~~2,500~~ 3100	of Sandalwood Oil at	
Depreciation	2,000	25 Shillings a pound	
Agency charges	1,875	or Rs.18-12-0	37,500
Cost of Sandalwood	19,000	~~Net Profit~~ Gross Profit	~~10,125~~ 9523
Net Profit	9523		
	37500		37500

This is a monthly estimate of profit which may vary according to the price we pay to the Forest Department for the Sandalwood and according to the market rates prevailing in London for the Oil. So long as the War lasts and probably for a year or two afterwards it is likely that the rates for Sandalwood Oil will maintain a high level and if during this period we can establish a factory on a sufficiently large scale to deal with the whole of the Sandalwood available in the South of India, these prices may be maintained indefinitely by cutting off the supply of Sandalwood to the market.

I would take this opportunity of emphasising the point that the whole success of this enterprise depends upon our being able to put on the London market absolutely pure Sandalwood Oil of a quality equal to that which has hitherto been supplied. This means that

every

every consignment of Oil before it leaves our works must be carefully examined and tested and any defective Oil ruthlessly rejected. It will only be possible to ensure this if we have a competent staff. In the preliminary experimental work we have done so far I have carefully kept this in view and the successful out-come of the experiments is entirely due to this. We have a considerable number of engineering and chemical problems to face but I am confident that if Government are pleased to sanction my proposals, we shall be able to successfully get over these difficulties and I would repeat what I have already said regarding the advantages to be obtained from an early starting of the work.

I have discussed the question as to how long it will take to establish this factory with Dr. Sudborough and we both think that it will take at least six months to get the machinery out from England and that we can hardly expect to start work under nine months. It seems to me that it will be a great pity not to make an effort to enlarge our present scale of operations which at present only permit an out-turn not exceeding Rs.1,500/- a month and I propose as soon as the chipping machine arrives, and it is now in the Madras Harbour, to see if it will be possible to pick up a second-hand boiler and rig up some temporary arrangement of stills which will enable us to turn out a sufficiently large quantity of Oil to commence sending consignments to London. On this point I shall address Government again as soon as the chipping machine has been obtained and experiments tried with it. This temporary work I propose to carry on simply to bridge over the interval which must necessarily elapse between ordering the plant and the actual setting it in operation.

I have the honour to be,

S i r,

Your most obedient servant,

Syna Chatterton

Director of Industries & Commerce.

CONFIDENTIAL.

Government of His Highness the Maharaja of Mysore.

GENERAL AND REVENUE DEPARTMENTS.

G. O. No. 53-58—A.&I. 80-15-3, dated 30th October 1915

Sandalwood Oil Factory.

Sanctioning the proposals of the Director of Industries and Commerce for starting an experimental —

W. D. 1020—GPB—27-11-15—200

CONFIDENTIAL. **Sandalwood O**

CAMP No. 53-58—A. & I. 80-15-3, DATED 30TH OCTOBER 191

PROCEEDINGS OF THE GOVERNMENT OF HIS HIGH THE MAHARAJA OF MYSORE.

DEPARTMENTS OF EDUCATION AND AGRICULTUR

READ—

Letter No. 1117, dated the 23rd September 1915, from the Director of Industries a in Mysore, forwarding a copy of Dr. Sudborough's report regarding the enquiries made reference to Sandalwood Oil Distillation whilst in London and proposing that a sum c rupees be placed at the disposal of the Director for erecting a Sandalwood Oil Factory o Sankey's tank.

(Printed as annexure.)

2. Letter No. 1153, dated the 27th September 1915, from the same officer, fur estimates regarding the details of cost of the plant and of working expenses.

(Printed as annexure.)

Order No. Camp 53-58—A. & I. 80-15-3, dated 30th October

As a result of the experiments carried on in the Indian Institute of Sci the enquiries made by Dr. Sudborough on the subject of Sandalwood Oil in England, the Director of Industries and Commerce reports that it possible to start at once near Sankey's reservoir, as a profitable concer experimental factory capable of dealing with about five tons of sand week and requests that a sum of one lakh of rupees be placed at his disp purpose.

2. An approximate estimate of the proposed Sandalwood Oil Disti the monthly expenditure for working expenses as calculated roughly by t of Industries is given in the appendix attached to the order.

3. Government are pleased to sanction the erection of a Sandalwo tory as proposed by the Director.

It may be located on the site of the Sankey's reservoir lodge and t building utilised as an office. In erecting buildings and putting up the the Director is requested to bear in mind the temporary character of Should the results of the present experiment prove satisfactory, the fact finally located at a place, where there are greater facilities for the su and sandalwood. He should also make proper arrangements for the el posal of all waste materials and refuse from the factory and for the re water taken for condensation to Sankey's reservoir.

4. As regards the proposal of the Director to engage the services borough and Dr. Watson of the Indian Institute of Science as Consultin to provide him with competent technical advice and chemical assistan ment have no objection to pay them a reasonable fee for their joint serv to a maximum of Rs. 500 a month according to the extent of the servic by them and also to make a terminal payment of Rs. 30,000 if, as a re investigations and assistance, Government are able to open a larger fac turnover of at least two lakhs of rupees a month. The Director is r consult the gentlemen and send up further proposals in the matter to the draft of an agreement to be entered into by them and a set of rules their work and their relation towards the concern and the managem The agreement should provide for Government having the full benefit proved processes and appliances that may be discovered or invented by receipt of these proposals, final orders will issue on this point.

5. The Director of Industries should intimate to the Conservator of Forests in Mysore, from time to time, the quantity of the sandalwood and fuel required for the factory, to enable that officer to make the necessary arrangements for supplying the same. The sandalwood will be charged at the average rates realised at the sales each year and firewood at nine rupees a ton.

6. The Director will be responsible for the general management of the concern and for securing suitable plant, erecting the factory and for all technical details connected with the working thereof. A board consisting of the Comptroller and the Financial Secretary to Government, the Conservator of Forests and the Secretary to the Industries and Commerce Committee will be associated with him for the management of the concern on proper commercial lines. The Director is requested to frame necessary rules for the conduct of business in communication with these officers and forward them for approval of Government. Accounts should be maintained on strictly commercial lines.

7. A grant of one lakh of rupees is sanctioned for purchase of machinery, etc., in connection with the factory. The Director is authorised to place an order for all articles of machinery urgently required, forwarding a list thereof to Government and furnish detailed estimates in due course for the sanction of Government. Except in every urgent cases the Director should obtain the previous sanction of Government in the case of all purchases of machinery and stores, where the cost is likely to exceed Rs. 3,000 and conform, as far as possible, to the rules issued in Government Order No. Fl. 2760-809—G. F. 214-10-88, dated the 23rd December 1913.

8. The Director is requested to apply for an additional grant for working expenses in time for sanction when the work is about to be commenced. Government do not consider it necessary to debit the concern at present with any portion of the Director's salary.

As regards establishment, the Director may send in his proposals for the establishment as needed from time to time. As far as possible this establishment should be recruited locally and, if competent men are not forthcoming, arrangements may be made to entertain others for temporary periods and train up local men.

9. The Director is requested to further investigate the question as to the most advantageous methods of disposing of the oil in foreign markets and submit proposals in due course in the matter as also on the arrangements to be made to ensure a high quality and purity of the article.

10. The Director is requested to arrange for giving the necessary industrial and chemical training in the factory to at least three men at a time, preferably graduates in Chemistry or if they are not available, undergraduates who have passed the Intermediate Examination with credit in Chemistry. The selection may be made in consultation with the Inspector-General of Education and the names submitted for the approval of Government.

11. The Director should submit a quarterly report of the working of the factory with a correct balance sheet.

P. G. D'SOUZA,
Offg. Secy. to Govt., Depts. of Edn. & Agri.

To—The Director of Industries and Commerce.
The Comptroller, Mysore Government, through Branch II.
The Secretary, Economic Conference.
The Conservator of Forests in Mysore.
The Secretary, Industries and Commerce Committee.
The Secretary to Government, Revenue Department.

Exd.—C. R.

CAMP No. 53-58—A. & I. 80-15-3, DATED 30TH OCTOBER 1915

APPENDIX.

Approximate estimate of cost of proposed Sandal Oil Distillery.

		Rs.	a.	p.
Building, boiler house, sandalwood store and fuel shed	...	30,000	0	0
Boiler foundations, chimney, etc.	...	7,500	0	0
Steam still and condenser	...	5,000	0	0
Water still and steering gear, electro motor and condenser	...	20,000	0	0
Chipping machinery and disintegrators	...	5,000	0	0
Shafting and motor for above	...	4,000	0	0
Water supply including pumps, delivery pipe and elevated tank	...	15,000	0	0
Oil tanks for storeage (copper or aluminium)	...	3,000	0	0
Laboratory equipment	...	3,000	0	0
Workshop and packing tools	...	3,500	0	0
Office furniture, safes and miscellaneous items	...	2,000	0	0
Contingencies	...	2,000	0	0
Total	...	1,00,000	0	0

Statement of approximate expenditure for working the Sandal Oil Distillery.

ESTABLISHMENT.

		Rs.	a.	p.
Consulting Chemists	...	500	0	0
Works Manager	...	200	0	0
2 Assistants, 100	...	200	0	0
2 Mechanics, 40	...	80	0	0
6 Firemen, 10	...	60	0	0
30 Unskilled labour 10	...	300	0	0

CLERICAL ESTABLISHMENT.

1 Head Clerk, 60 1 Accountant, 40 1 Clerk, 20 3 Peons, 24 2 Watchmen, 16	...	160	0	0
Working expenses—				
Fuel	...	1,350	0	0
Power and light	...	750	0	0
Packing frieght, etc.	...	1,000	0	0
Depreciation	...	2,000	0	0
Agency	...	1,875	0	0
Cost of sandalwood	...	19,000	0	0
Total	...	22,975	0	0

CAMP No. 53-58—A. & I. 80-15-3, DATED 30TH OCTOBER 1915.

ANNEXURE 1.

Letter No. 1117, dated 23rd September 1915, from the Director of Industries and Commerce, to the Secretary to the Government of Mysore, Departments of Education and Agriculture, Bangalore.

With reference to Government Order No. 3497-3501—A. & I. 69-14-14, dated the 22nd March 1915, I have the honor to forward the report submitted by Dr. Sudborough embodying the results of his enquiries with respect to the prospects of the manufacture of Sandalwood Oil in this State.

Dr. Sudborough was asked:—

(1) To ascertain how the trade in sandalwood and sandalwood oil has hitherto been conducted in Europe and America and through what agency;

(2) To ascertain as far as possible details of the methods at present employed for extracting the oil from sandalwood;

(3) To obtain plans and estimates for a complete Sandalwood Oil Distillation plant;

(4) To ascertain the views of the large users of Sandalwood Oil in regard to the agency which should be employed by the Mysore Government for the disposal of the sandalwood oil manufactured in Mysore with a State guarantee as to its purity;

(5) To ascertain the best methods of shipping the oil from Mysore to Europe.

Dr. Sudborough appears to have taken a large amount of trouble to obtain information on all these points and though the results of his enquiries are not as conclusive as I should like, he has obtained a large amount of very useful information which will enable us to advance, at any rate, another stage in the development of this industry in the Mysore State. The most important definite information which he has obtained is:—

(1) That the sandalwood oil manufactured by steam distillation at the Indian Institute of Science is equal to the best oil on the English Market and that so far as the quality of the oil is concerned, the process of steam distillation is thoroughly satisfactory;

(2) That there will be no difficulty in making commercial arrangements for the disposal of the oil in London and that, in fact, he has obtained the names of a number of firms who will be quite willing to take up the agency;

(3) That the oil can be shipped to Europe in sealed tin plate drums similar to kerosine oil tins;

(4) That the method of steam distillation is not used by English manufacturers of sandalwood oil but that it is almost certainly used by the German distillers. Dr. Sudborough has ascertained that nowhere in England is sandalwood oil manufactured in very large quantities and that no firm has any experience on a large scale of the manufacture of the plant suitable for Sandalwood Oil Distillation.

As was expected, no one manufacturing sandalwood oil would give him any information regarding the process. Combining the experience that we have gained during the past nine months at the Indian Institute of Science with the information collected by Dr. Sudborough, I am now able to submit the following as definitely ascertained facts:—

(1) That sandalwood oil may be extracted either by steam distillation or by boiling the wood in a closed vessel fitted with continuous stirring arrangements and that the quality of the oil produced by either process is practically the same and that so far as this point is concerned, either process can be adopted;

(2) That the steam distillation process, provided that the wood can be reduced to a suitable form, is the simplest and cheapest to adopt as regards the working expenses and the initial outlay on the plant;

(3) That there will be no difficulty in getting stills to work by either process.

An important matter upon which definite information has not yet been obtained is the breaking up of the wood so as to obtain it in the form most suitable for the distillation process.

Dr. Sudborough has purchased two different types of machines but neither of them has yet arrived here and the French machine from which I expect that the most favourable results will be obtained, is not likely to be sent out for several months. The whole question as to whether we should adopt steam distillation or boil the sandalwood chips in water entirely depends on whether we can successfully and cheaply reduce the wood to a form suitable for steam distillation. We are doing this now in a very satisfactory way in the case of Ghotla wood by turning it up in a lathe; but this process is not applicable to roots and irregular pieces of wood. There is no doubt that a chipping machine and a disintegrator will reduce the wood to a suitable form for the extraction of oil by boiling. So far as I can see, it will take at least six months and may take possibly a year or even longer before we can finally decide whether steam distillation is practicable or whether we shall have to adopt the method of boiling the wood. I am almost certain that the steam distillation method will prove the best to adopt as soon as we can find a suitable machine for cutting up the wood: but if we wait for this, we shall lose a large amount of valuable time.

Previous to the outbreak of war, the net revenue to Government from the sale of sandalwood amounted to over 20 lakhs of rupees a year and if we establish a Sandalwood Oil Factory in this State, we may fairly calculate on a net revenue under the old conditions of not less than 24 lakhs of rupees a year, or say two lakhs a month. The sooner we get to work the sooner we shall be in a

position to realise whatever profits are to be got from the sandalwood monopoly and from the manufacture of the oil in the State. At the present time, the price of sandalwood oil in London is very high but there is no very large demand for sandalwood mainly because the largest buyers are entirely cut off from the market and it is possible will be cut off from the market for a long time to come. I allude to the possibility of the prohibition of the sale of sandalwood to German distillers. Apparently no one at the present time is willing to invest large sums in sandalwood or to take any risks which they would have to take if they made any attempt to capture the business hitherto done in Germany. Now the position of the Mysore Government is entirely different. The Government has the whole of the sandalwood in its hands and it involves no investment of capital to start a Sandalwood Oil Distillery beyond what is necessary for the plant and machinery. Government therefore start with an enormous initial advantage over any private competitor who will have to lock up a large amount of capital in sandalwood before he commences work. I therefore urge as strongly as I possibly can that Government should proceed with the development of this industry as rapidly as possible. It is desirable of course to keep the capital outlay down to the minimum possible; but the immediate advantage to be derived is so very great that it will be extremely unwise to delay matters for the sake of effecting petty economies.

The proposals submitted by Dr. Sudborough at the conclusion of his report fall in with my own views as to what should be done. The proposal is to establish two stills in Bangalore each capable of dealing with from two to three tons of sandalwood per week, or say five tons a week, which will yield as gross revenue from the sale of the oil Rs. 25,000 a month or 3 lakhs a year. The expenditure on this plant will be less than one lakh of rupees but it is not possible to submit complete detailed estimates as the stills have to be manufactured and working drawings sent out to this country before the final plans can be drawn out here. I therefore definitely propose to Government that the sum of one lakh of rupees be placed at my disposal to erect a Sandalwood Oil Factory on the edge of the Sankey's Tank from which we can draw a supply of water for condensation purposes and which water will be returned to the tank so that it will not in any way interfere with the supply of water to the Palace Gardens. I request that I may be authorised to purchase all the necessary plant for the establishment of this Factory under such conditions as will ensure the minimum amount of delay in getting it. The details of the Factory will have to be worked out in consultation with the makers of machinery. The plant to be purchased includes the following major items:—

(1) A self-contained steam boiler to generate about 2,000 pounds of steam per hour and fitted with a wood burning furnace.

(2) One Steam Still capable of holding a ton of prepared sandalwood and yielding according to our present information about 30 pounds of oil per day.

(3) A Boiling Pan with stirring arrangements to deal with from a ton to a ton and a half of sandalwood at a time and capable of turning out from 30 to 40 pounds of sandalwood oil per day.

(4) A circular saw, 2 or 3 chipping machines and a disintegrator.

(5) One Weigh-bridge and two weighing machines for weighing the material dealt with at the various stages of the work.

(6) An Electro-motor and shafting to drive the wood preparing machinery.

(7) Electro-motors and Pumps for dealing with the condensing water and a water-supply to the boilers and to the stills.

(8) All the necessary tanks and measuring apparatus.

(9) A Water Tower with a water tank on the top to supply water to the whole place with a sufficient pressure to carry on the work.

(10) A Motor Generator and an electric light plant for night work.

The Factory will consist of two portions; the outer portion will contain the steam boiler, the pumps, the firewood store and everything not directly connected with the sandalwood oil manufacture; the inner portion which will only be open to the actual working staff will contain the sandalwood, the stills and the sandalwood oil tanks and will be so arranged as to preclude the possibility of the unauthorised removal of any sandalwood or its products. It will probably take six months to get the steam boiler and all the individual items of the plant from England and during that time the buildings can be erected and all the details of the plant worked out.

The object of this Factory is first to manufacture sandalwood oil and secondly to determine which of the two processes possible is the best to adopt on a large scale. I am inclined to think that for different kinds of wood it will probably be necessary for the final Factory to have both processes at work and if my conclusions prove to be correct, all the plant and machinery which I now propose to purchase can be used in that final Factory.

I am not prepared to undertake the constructions and working of this factory unless I am provided with competent technical advice and chemical assistance and I think such assistance as I require can be rendered by Dr. Sudborough and Dr. Watson of the Institute of Science. I have enquired from them if they are willing to jointly place their professional services at the disposal of the Mysore Government for all investigations necessary to put the Sandalwood Oil Factory on a thoroughly sound technical basis. They are willing to do this but have left it to me to suggest suitable terms on which they are to be remunerated. To this question I have given much consideration and the proposals which I now submit are based upon the idea that Government should not be called upon to pay high fees till the work has been demonstrated to be a commercial success. I propose to offer Messrs. Sud-

borough and Watson a fee of Rs. 500 a month as Consulting Chemists to the Government of Mysore in regard to the manufacture of sandalwood oil, that if Government abandon the manufacture of sandalwood oil, they should have no claim upon Government but that if in consequence of the assistance rendered, the sandalwood oil manufacture becomes a permanent feature of the State Administration, they should continue to be Consulting Chemists to the Government of Mysore on a salary of Rs. 500 a month so long as they remain in India but that if at any time Government wish to terminate the agreement, they should pay to Messrs. Sudborough and Watson a sum of Rs. 30,000. I would point out that there would be a large amount of work to do in starting this sandalwood oil Factory and that a fee of Rs. 500 a month is a very moderate remuneration for two highly trained experts whose time will be largely taken up with the various problems which will arise in connection with this industry. After the factory is once established, the consulting work will not be of a very onerous character and that then the fee will be adequate. In regard to the terminal payment of Rs. 30,000, that charge will only arise when Government are carrying on an indusrty with a net turn over of from 25 to 30 lakhs of rupees a year. These proposals in regard to remuneration are analogous to the agreements usually entered into with the Managing Agents of commercial concerns. If Government are not prepared to accept these terms, it will be necessary to employ permanently an expert Chemist who will require a high salary and it will probably be very difficult to get a man to come out and much delay may thereby be caused. I have no hesitation in saying that the proposals I submit are extremely reasonable. If Government are pleased to approve of the general conditions, the minor details can be easily embodied in the agreement. Amongst minor details, I should provide for the adequate training of Indian assistants to carry on the work in the factory.

In conclusion, I would desire to point out that if Government wish to obtain the large revenue they have lately enjoyed from the sandalwood monopoly, it is necessary to proceed on commercial lines and to place the matter in the hands of people they can trust. The ordinary procedure of Government with the vast amount of delay entailed in getting estimates sanctioned is wholly inapplicable. The expenditure which I contemplate is only equal to four months revenue of the factory after it is at work and is only equivalent to placing at my disposal about a hundred tons of sandalwood now lying in the forests or at the sandal kotis. The position is an altogether abnormal one. Government have everything to gain by proceeding rapidly with this business and I would strongly urge that orders should be issued on these proposals with the minimum possible delay.

(Enclosure to above.)

REPORT ON SANDALWOOD DISTILLATION.

At Colombo I received a telegram from the Hon'ble Sir Hugh Daly, British Resident in Mysore, stating that, as Mr. Gubbay had left London, Professor Wyndham R. Dunstan, F. R. S. of the Imperial Institute, was making enquiries for the Mysore Durbar on the question of the distillation of sandalwood. On reaching London I had an interview with Professor Dunstan. He showed me a considerable amount of correspondence he had received on the subject, but gave me no details as regards the distillation of the oil in England or abroad. Professor Dunstan gave me the names of several makers of chemical plant and machinery and from these firms I was able to get to know of others who specialised in the manufacture of stills and chipping machines. Professor Dunstan also tried to obtain permission for me to visit works where sandalwood distillation was carried on, but firms were not willing to admit me to their premises. As the result of numerous visits I have been abled to collect the information grouped under the following heads :—

I. Methods of distillation.
II. Types of stills.
III. Chipping or Rasping machines.
IV. Methods of packing.
V. London Agency.

Most of this information has been gathered from the makers of machinery, and not from distillers. The only firm of distillers at all willing to give me information were Messrs. Whiffin of Battersea.

Mr. Whiffin stated that he regarded it as certain that, sooner or later, the distillation of sandalwood would be undertaken in India.

In an interview I had with Mr. Lescher. one of the managing directors of Messrs. Evans Son Lescher and Webb of St. Bartholomew's Close, the suggestion was made that, if the exportation of sandalwood from Mysore were stopped, English and foreign distillers would attempt to obtain wood from other sources, and he mentioned the occurrence of sandalwood in Java, Mauritius and especially in Western Australia. The question of the occurrence and use of sandalwood in Western Australia I referred to Prof. Dunstan, and his reply shows that the competition from Western Australia could not be of a severe character. From the data given the yield of oil is poor and the oil itself is much inferior to East Indian oil. I understand that the cost of collecting the timber is high as the trees are very scattered. A small amount of the wood is distilled in Western Australia as several years ago a distilling plant capable of dealing with 3—4 tons of wood per week was sent to the Colony by Messrs. Bennett Son & Shears.

Messrs. Gildmeister and Hoffman state that the oil has properties entirely different from East-Indian sandalwood oil and can therefore never be used as a substitute for the East Indian oil, although it is used as an adulterant.

As regards the relative proportions of wood distilled in different countries it is not possible to give accurate information. The proportions vary from year to year, but the general opinion is that Germany takes the greater portion.

The two chief uses to which the oil is put are :—

(*a*) Medicinal

(*b*) For perfumery and soap-making.

According to Mr. Lescher the great bulk is used medicinally and the tendency is rather in the direction of an increase than a decrease in its use for this purpose.

The price of the oil on the London Market is extremely high. In the first week of August the wholesale price was 27/9 per lb. and the general opinion is that the price will rise.

There is a good demand for the oil in London. Messrs. Evans Son, Lescher and Webb would be willing to take several hundredweight per month and Messrs. Burgoyne, Burbidges & Co., are also prepared to purchase the oil.

Samples of the oil were forwarded to four or five different firms. The only firms who reported on the oil, *viz.*, Messrs. Burgoyne, Burbidges & Co., and Messrs. Whiffin, state that the oil is of good quality and fulfils all the requirements of the British Pharmacopœia. See copy of reports appended.

I. METHODS OF DISTILLATION.

Apparently the only method of distillation adopted in England is that of boiling the finely divided wood with water. This information I gathered both from the makers of plant for some of the biggest distillers and also from two firms engaged in distilling the wood. A similar method is adopted in France. I could obtain no direct information about the German method of distillation but from information given in Richenberg's "Gewinnungund Trennung der ætherischeh Oele" it is certain that they adopt the method of treating the wood directly with steam.

The state of division of the wood varies according to the method of distillation adopted. When the English method of boiling with water is used, the wood is always in a fine state of division and the most convenient method of doing this is by passing the wood through a disintigrator.

When live steam is used it is essential that the wood should not be used in the form of a powder, but in the form of turnings, raspings or chips. I could not obtain information as to the best form of turnings or chips to use for this purpose, and the information can only be obtained by actual experiment.

I was told that one firm had tried the use of direct steam but had abandoned that method and adopted the method of boiling with water. Mr. Whiffin informed me that the oil obtained by the direct use of steam differs in colour, rotatory power and solubility from the oil prepared by the English method. This can only be true when superheated steam is used as the oil prepared in the Laboratories of the Indian Institute of Science does not differ from English made oil as regards colour, rotation or solubility.

II. TYPES OF STILL.

A. *For boiling with water.*—The still used for this purpose is of the following type. The body consists of a copper boiler surrounded by a cast iron jacket through which steam is passed. The upper part of the still is also of copper and is heavily tinned, and terminates in a delivery tube of pure tin attached to a pure tin condensing coil. Several firms I interviewed insisted on the necessity of having the delivery tube and the condensing tube made of pure tin, as copper lightly tinned does not last, the tin is rapidly removed by the great rush of steam and then the bare copper discolours the oil. The still is half filled with a mixture of water and finely divided wood which is kept in motion, during the whole time the distillation is proceeding, by means of a slowly driven stirrer or rouser. The usual time required for removing the oil from a charge of wood is 72 hours.

The distillate after removal of most of the oil in the separator is returned to the still.

The stills of the type made by Messrs. Bennett Sons & Shears, Ltd., (now incorporated with H. Pontifex & Sons, Ltd. The Farringdon Works, Shoe Lane, E. C.) are of 900 gallons capacity. The diameter is 6' and each still will take a charge of 1/3 to 1/2 ton. The price for a still, including tin worm condenser, separator and return pipe, is given as approximately £400.

To obtain the wood in a fine state of division it is first cut by means of a circular saw, then chipped by means of a machine of French make and is finally passed through a disintegrator.

For a complete plant capable of dealing with about 3 tons of wood per week by this method this firm quote an approximate price of £3,000. This includes boilers, steam engine, pumps, tanks, circular saw, chipping machines, disintegrator, stills, condensers, separators and necessary belting, pipes, cocks, etc.

Messrs. John Dore & Son of Bromley-by-Bow, E. C., make a still of similar pattern. Each still is capable of taking from 28-30 cwt. of wood powder at a charge and, as each charge requires 72 hours for complete distillation, a single still would be capable of dealing with about 3 tons of wood per week. This firm makes use of a patent dome condenser and finally cools the distillate by means of a pure tin worm. Their price for a still, condenser and separator together with frame work is £1,180.

Messrs. W. J. Fraser & Co., of Dagenham Essex, promised to give me a quotation for a distilling plant but did not do so, and I gather that they are not makers of this type of plant.

CAMP. No. 53-58—A. & I. 80-15-3, DATED 30TH OCTOBER 1915.

B. Direct treatment with steam.—Messrs. Blair Campbell & McLean, Ltd., of Govan, Glasgow have erected large plants for dealing with cedar wood in America but have had no experience in dealing with sandalwood.

They have given a quotation for a complete plant dealing with 1,250 tons of wood per year The plant consists of steel stills, copper condensers and separators, steam boiler, wood chipper. engine, electric generator, elevator and necessary iron buildings and the price quoted is £2,500 (approximately).

This estimate is based on the assumption that a charge of wood could be dealt with in 24 hours; this is too low a value, it should probably be 52 or even 70, and this would entail a much larger number of stills and condensers and increase the cost probably to £6,000 or £7,000. By the substitution of tinned copper stills the above price of £2,500 would be increased by about £515.

No arrangement is made in this plant for returning the distillate to the still and it would be an advantage to have such an arrangement.

Messrs. George Scott & Son, Ltd., also suggested iron stills but according to Messrs. John Dore & Son both iron and aluminium stills have been tried and are not a success as they pit very readily.

Messrs. George Scott & Son, Ltd., have made a small still for dealing with about 2 cwt. of wood. The chipped wood was packed in a cage which was suspended in the still. A small amount of water was placed below and steam was blown into this.

I have obtained estimates for a copper still for treating about one ton of chipped wood at a charge. This still is specially designed for experimental purposes and the prices quoted are.

	£	
Messrs. Brown & Son of Caledonian Road	200	Approximately.
,, Geo. Scott	637	,,
,, John Dore & Co.	640	,,

III. CHIPPING MACHINES.

I found considerable difficulty in obtaining detailed information with regard to rasping or chipping machines and also in obtaining samples of wood which had been chipped by any particular type of machine.

In England apparently only two types of machines are used namely (*a*) English and (*b*) French.

(*A*) *English machine.*—Two firms make machines of this type namely Messrs. R. G. Abererombie, Broad St. Engine Works, Alloa N.B. and Messrs A. Ransome & Co., Ltd., Stanley Works, Newark or Trent.

The machine consists of a large revolving disc with projecting knives and the wood is held at an angle against the revolving disc. The depth of knife edge projecting can be varied in order to give chippings of different thickness, the type of chip also varies considerable with the angle at which the grain of the wood is held against the disc. Usually four blades are used and they require re-grinding fairly frequently. I have bought a second hand machine of this type from Messrs. Abererombie for £40. This same firm make a larger machine of the same type. This is provided with an automatic feed and is designed for chipping log wood and other dye woods before treatment in extracting vats. Such a machine turns out about 3 or 4 tons of log wood per day and costs about £500.

Messrs. Ransome & Co.'s machine is of the same type, is somewhat more compact and has rather smaller knives. The price of this machine as quoted by Messrs. Fraser is £47. It is capable of turning out 480—600 lbs of quassia chippings per hour and requires 9-13 B.H.P. according to the thickness of the chips.

Messrs. J. Harrison Carter, Ltd., Engineering Works, Dunstable quotes £35 for what is apparently the same machine.

Messrs. Stafford Allen & Co., one of the chief distilling firms in England, use a machine of this make but have altered it somewhat and have fitted it with an automatic feed.

Messrs. Blair Campbell and McLean have sent me a quotation for large chipping machines. The smallest of these costs £500 requires 50 H.P. and chips 3,000 lbs of wood per hour. These machines are not made by Messrs. Blair Campbell and McLean. It is a 'Williams' machine made in America and has been used with success on cedar wood in that country. I was not able to obtain samples of wood chipped by this type of machine.

(*b*) *French machine*.—The French Machine differs in having a heavy fly wheel and in having the knives inserted at an angle through a truncated cone. These machines are not provided with automatic feeds.

A machine recommended by Messrs. Bennett Son & Shears costs £80 and would turn about half a ton per day.

Messrs. Whiffin recommended machines made by Messrs. T. Robatel, J. Buffand & Co., Chemin de Baraban 59-69, Lyon. The smallest size of this machine costs £60 and is capable of dealing with one ton of wood per day and requires only 2 H.P. The largest size costs £120, chips about ten tons per day and requires 15-20 H.P.

This machine has two sets of knives and is thus more efficient than the one recommended by Messrs. Bennett Son & Shears.

I have ordered the smallest size of this type of machine but it will be 3-4 months b be ready for delivery.

III. METHOD OF PACKING OIL FOR EXPORT.

All the firms I consulted were of opinion that the best method of packing the oil for to London was in *Stout* iron drums or rectangular tins *well tinned* and with caps solde sizes should be 14, 28 or 56 lbs. and the tins should be packed in wooden cases contai each.

IV. METHOD OF SALE AND LONDON AGENCY.

All the firms I consulted were of the opinion that the method of putting the oil u was not advisable as it would probably lead to 2 or 3 of the biggest firms combining an the whole amount.

The general view was that a London Agent working on a commission would deal w in the most satisfactory manner.

Of the firms I consulted the following stated that they were not prepared to take up t

Messrs. Burgoyne, Burbidges, Ltd.

Messrs. Evans Lescher, Son & Webb, Ltd.

On the other hand, the following firms expressed their willingness to undertake the a suitable terms.

Mr. C. H. Bryant, Henage Lane, Bury St., E. C.

Messrs. R. Morrison & Co., 2 Fen Court, E. C.

Messrs. H. B. Sleeman & Co., Ltd., India House Leadenhall St., E. C.

Messrs. Sparks and White, Albion Mills Tenter S. East, E.

Messrs. Whiffin & Sons, Ltd., Lombard Rd., Battersea, S. W.

Mr. Bryant asks for a 5 per cent commission and out of pocket expenses.

Messrs. Morrison ask for a commission of 2½ per cent on sales and in additio Government would pay for storage at Wharf and cost of insurance.

Mr. Soalfeld, the Chairman of Messrs. Sparks and White, stated that he was will take the agency mainly on account of the standing the agency would confer on his firm a ed one or two per cent as a suitable commission. Messrs. Sparks and White are dealer wood oil and sell from 5-6 tons a year.

Messrs. Sleeman & Co., Ltd., ask for a 2½ per cent commission and Messrs. Wl Ltd., ask for a 2 per cent commission and 1¼ per cent for bad debt risks.

RECOMMENDATIONS.

The present price of sandalwood is so high that the distillation of the wood should remunerative process, and it is advisable that the production of the oil on a fairly large be proceeded with as soon as possible. The results of the examination by Messrs Burbidges & Co., and by Messrs. Whiffin & Sons prove that the oil as distilled in t Laboratories is of high quality and fulfils all the requirements of the British and otl copœias.

The main question that has to be decided is whether the English method of d adopted or whether the method as now used in the institute should be used.

With the knowledge available it is difficult to decide between the two. The plant lish method would be more expensive—the stills as separate from the other plant wou times as much as the stills required for use with steem—also the working expenses woul heavier when water distillation is used. On the other hand, if the English method w at least two Engineering firms in England have standard stills and plant which they c within several months. With the direct steam method it would be necessary to make periments in order to determine the best type of still and it would be very rash to orde factory containing ten or more stills before further experiments with a still of about one has been carried out.

I would strongly urge the Government of Mysore to put up a small experimental f near Bangalore at a cost not exceeding one lakh of rupees. Such a factory should be eq the following:—

(*a*) Boiler and wood shed.
(*b*) Copper still for treating a charge of one ton of wood with steam.
(*c*) Copper jacketted still for boiling 1 to 1½ ton of powdered wood with water.
(*d*) Condensers and separators.
(*e*) Pumps, tanks.
(*f*) Weighing machines.
(*g*) Chipping machine and disintegrator.
(*h*) Store rooms and laboratory.

Such a factory should deal with at least 4 to 5 tons of wood per week and should gi of oil per week.

In such a factory experiments could be made with stills of much the same capacity as would be subsequently used in a large factory. Such experiments would enable the Government of Mysore to determine which of the two methods of distillation was the more economical and which gave the better results.

Towards the equipment for such a factory the Government will already have two chipping machines and a disintegrator.

J. J. SUDBOROUGH.

Sepetember 20th, 1915.

(Enclosure to above.)

REPORTS ON SANDALWOOD OIL DISTILLED IN THE LABORATORIES OF THE INDIAN INSTITUTE OF SCIENCE.

A. From Messrs. Burgoyne Burbidges & Co.,
East Ham,
LONDON, E.

We have tested the oil submitted by Dr. J. J. Sudborough and we find it is a very good sample. It answers all the requirements of the British Pharmacopœia.

Yours faithfully,
(Sd.) BURGOYNE BURBIDGES & Co.

July 22nd, 1915.

B. From Messrs. Whiffin & Sons, Ltd.,
Lombard Street,
Battersea.

With regard to the sample of sandal oil you left with us we have pleasure in advising you that we found this fully up to standard. It answers all requirements, its solubility is correct, likewise the optical refraction and other tests required by various Pharmacopœia.

Yours faithfully,
(Sd.) W. GEORGE WHIFFIN,
Director.

July 29th, 1915.

ANNEXURE (2).

No. 1153, dated 27th September 1915, from the Director of Industries and Commerce in Mysore, to the Secretary to the Government of Mysore, Departments of Education and Agriculture, Bangalore.

With reference to your D. O. No. 3, dated the 24th September 1915, and in continuation of my No. 1117, dated the 23rd September 1915, I have the honour to forward the following additional information regarding the working of the proposed Sandalwood Oil Plant to be erected at Hebbal.

I have ascertained definitely that the convenient site which I have selected is on land which has been handed over by Government to the Indian Institute of Science and permission will have to be obtained from the Council of the Institute to erect the building thereon. In this matter I anticipate no difficulty.

I append to this note a rough statement as to the estimated cost of the plant but I should like Government to clearly understand that it is only a rough estimate as conditions at the present moment preclude any possibility of preparing an accurate forecast of the expenditure. All I can now say is that I think I have provided more than sufficient to cover any probable contingencies. In regard to the working expenses and the profits likely to be obtained, I have gone into this matter carefully with Dr. Sudborough and we are agreed that the statement I now submit is one which is likely to be realised in the immediate future.

In my first letter No. 1117 of the 23rd instant, I pointed out that under the extraordinary circumstances now existing, the profits which Government would derive from the manufacture of sandalwood oil would be exceptionally large. From the information supplied to me by the Conservator of Forests, it appears that recently 143 tons, 14 cwts. 102 pounds of sandalwood have been sold realising Rs. 1,34,775 which works out to an average rate of Rs. 937-8-0 a ton. Our experiments at the Indian Institute of Science justify us in expecting that we can obtain 100 pounds of sandalwood oil from an average ton of wood. When Dr. Sudborough went on furlough, he took with him 10 or 12 lbs of sandalwood oil as samples and at the conclusion of his enquiries he had 5 or 6 pounds of sandalwood oil left and this he disposed of in London through an Agent at 26 shillings a pound equivalent to Rs. 19-8-0 per pound, that is to say, if we can still obtain the same price, there is a difference of Rs. 1,000 per ton between the cost of sandalwood and the value realised from the oil obtained from the wood. This very large difference is, as I have already pointed out, due to the exceptional circumstances prevailing at the present time. It appears that the bulk of the sandalwood oil was formerly manufactured in Germany and that the English Distillers only worked on a small scale. It further appears that at the present time they are not prepared to invest large sums of money in the purchase of sandalwood to be subsequently made into

oil. The result is that, at any rate on the London market, the price of sandalwood oil is now very high and the profit from its manufacture very considerable. In preparing the statement of profits which I now submit I have assumed that the average price we shall pay to Government for the sandalwood used in the Factory will be Rs. 950 a ton and that the average price we shall obtain in London will be 25 shillings a pound or Rs. 1,875 per 100 pounds, the quantity we expect to obtain from one ton of sandalwood. This leaves us a margin of Rs. 925 per ton to work upon.

The plant which it is proposed to instal, we calculate, will be able to turn out 2,000 pounds of oil per month and will consume 20 tons of sandalwood for which we shall pay the Forest Department Rs. 19,000. The following is an estimate of the working expenses including the cost of establishment and every other charge which can be foreseen :—

Director of Industries and Commerce.	Rs.	
Share of his pay to be charged to the Sandalwood Oil Factory ...	500	a month
Consulting Chemists	500	,,
Works Manager	200	,,
Two Assistants, Rs. 100 each	200	,,
Two Mechanics, Rs. 40 each	80	,,
Six Firemen, Rs. 10 each	60	,,
Thirty unskilled labour, Rs. 10 each	300	,,
Clerical establishment and peons.		
One Head Clerk	60	,,
One Accountant	40	,,
One Clerk	20	,,
Three peons on Rs. 8 each	24	,,
Two watchmen on Rs. 8 each	16	,,
Total ...	2,000	,,

Working expenses.—The principal item of working expenses will be fuel. In estimating the amount of fuel required, I assume that 3 tons of steam will be obtained from 1 ton of firewood and that from each ton of steam we shall obtain 4½ pounds of oil so that from a ton of firewood we shall obtain 13½ pounds of oil. The weight of firewood therefore required will be 2,000÷13½ which is approximately 150 tons and 150 tons of firewood at Rs. 9 a ton will be Rs. 1,350. The next important item will be power and light which I assume will cost us Rs. 750 a month and will be derived from the electric supply mains to the Indian Institute of Science. The cost of packing and freight on 2,000 pounds of oil per month is estimated at Rs. 500 and to be well on the safe side, I propose to allow a further Rs. 500 a month for unforeseen contingencies, bringing the total working expenses to Rs. 3,100 a month. The only other item to be allowed for is depreciation and for this item, considering the factory is a temporary one, I propose to allow a very large amount, *viz.*, Rs. 24,000 a year or Rs. 2,000 a month. We have then to meet the Agency charges in London and this I assume will be rather high as the quantity of oil to be delivered will not be very large. The firms in London have offered to do the work for 2½ per cent; but in this estimate I propose to allow for a maximum of 5 per cent or Rs. 1,875 a month.

The monthly balance sheet then works out as follows :—

	Rs.		Rs.
Establishment	2,000	By sale of 2,000 pounds of sandalwood oil at 25 shillings a pound or Rs. 18-12-0	37,500
Working expenses	3,100		
Depreciation	2,000		
Agency charges	1,875		
Cost of sandalwood	19,000		
Net profit	9,525		
Total ...	37,500	Total ...	37,500

This is a monthly estimate of profit which may vary according to the price we pay to the Forest Department for the sandalwood and according to the market rates prevailing in London for the oil So long as the war lasts and probably for a year or two afterwards it is likely that the rates for sandalwood oil will maintain a high level and if during this period we can establish a factory on a sufficiently large scale to deal with the whole of the sandalwood available in the south of India, these prices may be maintained indefinitely by cutting off the supply of sandalwood to the market.

I would take this opportunity of emphasising the point that the whole success of this enterprise depends upon our being able to put on the London market absolutely pure sandalwood oil of a quality equal to that which has hitherto been supplied. This means that every consignment of oil before it leaves our works must be carefully examined and tested and any defective oil ruthlessly rejected. It will only be possible to ensure this if we have a competent staff. In the preliminary experimental work we have done so far I have carefully kept this in view and the successful outcome of the experiments is entirely due to this. We have a considerable number of engineering and chemical problems to face but I am confident that if Government are pleased to sanction my proposals, we shall be able to successfully get over these difficulties and I would repeat what I have already said regarding the advantages to be obtained from an early starting of the work.

CAMP No. 53-58—A. & I. 80-15-3, DATED 30TH OCTOBER 1915.

I have discussed the question as to how long it will take to establish this factory with Dr. Sudborough and we both think that it will take at least six months to get the machinery out from England and that we can hardly expect to start work under nine months. It seems to me that it will be a great pity not to make an effort to enlarge our present scale of operations which at present only permit an outrun not exceeding Rs. 1,500 a month and I propose as soon as the chipping machine arrives, and it is now in the Madras Harbour, to see if it will be possible to pick up a second-hand boiler and rig up some temporary arrangements of stills which will enable us to turn out a sufficiently large quantity of oil to commence sending consignments to London. On this point I shall address Government again as soon as the chipping machine has been obtained and experiments tried with it. This temporary work I propose to carry on simply to bridge over the interval which must necessarily elapse between ordering the plant and the actual setting it in operation.

PROCEEDINGS OF THE GOVERNMENT OF HIS HIGHNESS THE MAHARAJA OF MYSORE.

&&&&&&&&

READ:-

Proper under disposal (1)

Letter No.1117 dated the 23rd September 1915 from the Director of Industries and Commerce in Mysore forwarding a copy of Dr. Sudborough's report regarding the enquiries made by him with reference to Sandalwood Oil Distillation whilst in London and proposing that a sum of one lakh of rupees be placed at the disposal of the Director for erecting a Sandalwood Oil Factory on the edge of Sankey's tank.

2. Letter No.1153 dated the 27th September 1915 from the same officer furnishing rough estimates regarding the details of cost of the plant and of working expenses.

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Order No. 53-58/A19. 80-15-3

Dated 30th October, 1915.

As a result of the experiments carried on in the Indian Institute of Science and of the enquiries made by Dr. Sudborough on the subject of Sandalwood Oil Distillation in England, the Director of Industries and Commerce reports that it would be possible to start at once near Sankey's reservoir,

as

as a profitable concern, a small experimental factory capable of dealing with about five tons of sandalwood per week and requests that a sum of one lakh of rupees be placed at his disposal for the purpose.

2. An approximate estimate of the proposed Sandalwood Oil Distillery and of the monthly expenditure for working expenses as calculated roughly by the Director of Industries is given in the appendix attached to the order.

3. Government are pleased to sanction the erection of a Sandalwood Oil Factory as proposed by the Director.

It may be located on the site of the Sankey's Reservoir Lodge and the existing building utilised as an office. In erecting buildings and putting up the machinery, the Director is requested to bear in mind the temporary character of the factory. Should the results of the present experiment prove satisfactory, the factory may be finally located at a place where there are greater facilities for the supply of fuel and sandal wood . He should also make proper arrangements for the efficient disposal of all waste materials and refuse from the factory and for the return of the water taken for condensation to Sankey's Reservoir.

4. As regards the proposal of the Director to engage the services of Dr. Sudborough and Dr. Watson of the Indian Institute of Science as Consulting Chemists to provide him with competent technical advice and chemical assistance, Government have no objection to pay them a reasonable fee for their joint services subject to a maximum of Rs.500/- a month according to the extent of the services rendered by them and also to make a terminal payment of Rs.30,000 if as a result of their investigations and assistance Government are able to open a larger factory with a turnover of at least two lakhs of rupees a month. The Director is requested to consult the gentlemen and send up further proposals in the matter together with the draft of an agreement to be entered into by them and a set of rules to regulate their work and their relation towards the concern and the management thereof. The agreement should provide for Government having the full benefit of any improved processes and appliances that may be discovered or invented by them. On receipt of these proposals, final orders will issue on this point.

5. The Director of Industries should intimate to the Conservator of

Forests in

in Mysore from time to time the quanti-
ty of the sandalwood and fuel required
for the factory, to enable that officer
to make the necessary arrangements for
supplying the same. The sandalwood
will be charged at the average rates
realised at the sales each year and
firewood at nine rupees a ton.

6. The Director will be responsi-
ble for the general management of the
concern and for securing suitable plant
erecting the factory and for all tech-
nical details connected with the work-
ing thereof. A Board consisting of
the Comptroller and the Financial Secre
tary to Government, the Conservator of
Forests and the Secretary to the Indus-
tries and Commerce Committee will be
associated with him for the management
of the concern on proper commercial
lines. The Director is requested to
frame necessary rules for the conduct
of business in communication with these
officers and forward them for approval
of Government. Accounts should be
maintained on strictly commercial lines

7. A grant of one lakh of rupees
is sanctioned for purchase of machi-
nery, etc., in connection with the
factory. The Director is authorised
to place an order for all articles of

machinery

machinery urgently required forwarding a list thereof to Government and furnish detailed estimates in due course for the sanction of Government. Except in very urgent cases the Director should obtain the previous sanction of Government in the case of all purchasesof machinery and stores where the cost is likely to exceed Rs.3,000, and conform as far as possible to the rules issued in G.O. No.Fl. 2760-809/G.F.214 -10-88 , dated the 23rd December 1913.

8. The Director is requested to apply for an additional grant for working expenses in time for sanction when the work is about to be commenced. Government do not consider it necessary to debit the concern at present with any portion of the Director's salary.

As regards establishment, the Director may send in his proposals for the establishment as needed from time to time. As far as possible this establishment should be recruited locally and if competent men are not forthcoming arrangements may be made to entertain others for temporary periods and train up local men.

9. The Director is requested to further investigate the question as to the most advantageous methods of disposing of the oil in foreign markets and submit proposals in due course in the

matter as also on the arrangements to be made to ensure a high quality and purity of the article.

10. The Director is requested to arrange for giving the necessary industrial and chemical training in the factory to at least three men at a time, preferably graduates in Chemistry or if they are not available, under - graduates who have passed the Intermediate Examination with credit in Chemistry. The selection may be made in consultation with the Inspector General of Education and the names submitted for the approval of Government.

11. The Director should submit a quarterly report of the working of the factory with a correct balance sheet.

Offg. Secretary to Government,
Education & Agriculture.

SPR

To

The Director of Industries and Commerce.
The Comptroller, Mysore Government, Thro'
Branch II.
The Secretary, Economic Conference.
The Conservator of Forests in Mysore.
The Secretary, Industries and Commerce
Committee.
The Secretary, Revenue Department.

Approximate Estimate of cost of proposed Sandal oil distillery:

	Rs.	as.	p.
Building, Boiler House, Sandalwood Store & Fuel Shed.	30,000	"	"
Boiler foundations, Chimney &c	7,500	"	"
Steam Still and Condenser	5,000	"	"
Water Still and Steering gear Electro-motor & Condenser	20,000	"	"
Chipping machinery and disintegrators.	5,000	"	"
Shafting and motor for above	4,000	"	"
Water Supply including pumps delivery pipes and Elevated Tank	15,000	"	"
Oil tanks for storage (Copper or alluminium)	3,000	"	"
Laboratory Equipment	3,000	"	"
Workshop and packing tools	3,500	"	"
Office furniture, Safes and miscellaneous items	2,000	"	"
Contingencies.	2000	"	"
Total	1,00,000	"	"

Bangalore
27th September 15

Director of Industries & Commerce

Statement of approximate expenditure for working the Sandal oil distillery

	Rs as p	₹ as p	
Establishment: —			
Director of Industries (Share of Salary)	500 " "		(Co'n
Consulting Chemists	500 " "		
Works manager	200 " "		
2 assistants -100/—	200 " "		
2 mechanics 40/—	80 " "		
6 firemen 10/—	60 " "		
30 Unskilled Labour 10/-	300 " "		
Clerical Establishment			
1 Head clerk 60/-			
1 accountant 40/-			
1 clerk 20/-			
3 peons - 24/-		1500 " "	
2 watchmen 16/-	160 " "	2,000 " "	
Working Expenses:— Fuel	1350 " "		
power and Light.	750 " "		
	7,600 " "		
packing freight &c.	1,000 " "	3,100 " "	
Depreciation		2,000 " "	
Agency		1,875 " "	
Cost of Sandalwood		19,000 " "	
Total		27,975 " "	
		22,975 " "	

Bangalore
17th September 15.

J. Bowes Lattin
Director of Industries & Commerce

G.R.S. 26]

SUBJECT.....

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*Diary No. of letter replied to*_____

Section A-9
File No. 80-15-
Serial No. 10

General and Revenue Secretariat

( )

, *the* *191* .

No. Pol 539
Encore

Date of issue 29.11.15

To The A. Resident

Signed by allan P. G. D'Souza.

Sir,

I am directed to forward for your the info. of the Hon'ble the Resident in Mysore a copy of Govt. Order No. 553-558- A-9 80-15- dated 30th Oct. 1915 issued by the Durbar in the matter of erecting a

over.

Sandalwood Oil Factory

in Bangalore.

I have the

honour to

Sec. Ex. A

2644/15

W 9.11.15

W 9/11

20.11.15.

List of enclosures.

one copy.

Copied by

Examined by

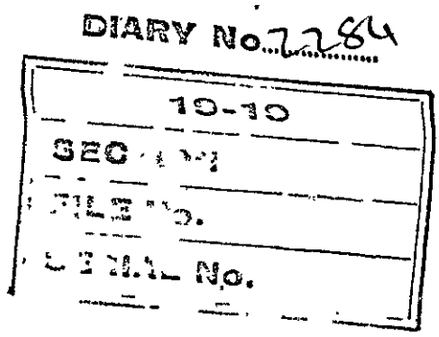
GPB—20,000—14-2-14

No. 3889

Pol 1264 dy 22-12-15

FROM

P. B. WARBURTON, ESQ., I. C. S.,
FIRST ASSISTANT TO THE RESIDENT IN MYSORE.



To

The Dewan of Mysore.

Dated Bangalore, 21st December 1915.

SIR,

In acknowledging with thanks, the receipt of a copy of the Durbar's Order No.53-58/A&I.80-15 , dated the 30th October 1915, in the matter of erecting a Sandalwood Oil Factory at Bangalore, I am directed to request that 6 spare copies of the said proceedings may, if available, be kindly supplied to this office.

I have the honour to be,

Sir,

Your most obedient servant,

P B Warburton

First Assistant Resident.

G.R.S. 26]

13/1

SUBJECT.....

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Diary No. of letter replied to 2284

Section

File No.

Serial No.

General and Revenue Secretariat

( )

, *the* 191 .

No. Pol 703
Ecn 6.

Date of issue 18 / 1 / 16.

To

The A. A. Resident.

Signed by Alex P. J. D'Souza.

Sir,

As desired in your letter no. 3889 dated the 21st December 1915, I am directed to forward herewith 6 copies of G.O. no. 53-58 dated the 30th October 1915, issuing orders in the matter of the erection of a Sandalwood Factory at Bangalore.

Aff. 80-15

I have to,

Your
Secretary
Dpt
Ecn & Dept
31-12-15 1/1/16